

CLAIMS

What is claimed is:

1. A rotary valve for a balloon catheter, comprising:
a hollow guidewire having a central lumen; and
a portion of a rotary shaft disposed within a proximal end of the hollow guidewire, wherein flow of an inflation fluid through the central lumen of the hollow guidewire is controlled by rotating the rotary shaft of the rotary valve.
2. The valve of claim 1 wherein an outer surface of the rotary shaft within the proximal end of the hollow guidewire slidably contacts a portion of an inner surface of the hollow guidewire.
3. The valve of claim 1 wherein the rotary shaft includes one of a flat or a channel formed on a side of a distal end of the rotary shaft to allow fluid flow into the central lumen of the hollow guidewire when the rotary valve is open.
4. The valve of claim 1 wherein a first portion of the rotary shaft within the proximal end of the hollow guidewire has a first diameter sized for a slidable rotating fit within an inner diameter of the hollow guidewire, and a second portion of the rotary shaft adjacent to a proximal end of the hollow guidewire has a second diameter substantially equal to an outer diameter of the hollow guidewire.
5. The valve of claim 1 further comprising:
an inflation hole formed in a sidewall of the hollow guidewire that allows fluid to be injected into the central lumen of the hollow guidewire when the rotary valve is open.

6. The valve of claim 1 further comprising:

a containment groove circumferentially disposed about the rotary shaft, the containment groove mated to a protrusion extending inwardly from an inner diameter of the hollow guidewire to prevent axial movement of the rotary shaft within the hollow guidewire.

7. The valve of claim 1 further comprising:

a polymeric plug formed around a portion of the rotary shaft within the hollow guidewire, the polymeric plug providing a fluid seal near the proximal end of the hollow guidewire.

8. The valve of claim 7 further comprising:

a channel formed in a portion of the polymeric plug to allow fluid flow into the central lumen of the hollow guidewire when the rotary valve is open.

9. A system for treating a vessel in a body, comprising:

a hollow guidewire having a central lumen;
an inflatable balloon attached near a distal end of the hollow guidewire; and

a rotary valve including a portion of a rotary shaft disposed within a proximal end of the hollow guidewire, wherein flow of an inflation fluid through the central lumen of the hollow guidewire and into an interior region of the inflatable balloon is controlled by rotating the rotary shaft of the rotary valve.

10. The system of claim 9 wherein an outer surface of the rotary shaft within the proximal end of the hollow guidewire slidably contacts a portion of an inner surface of the hollow guidewire.

11. The system of claim 9 wherein the rotary shaft includes one of a flat or a channel formed on a side of a distal end of the rotary shaft to allow fluid flow into the central lumen of the hollow guidewire when the rotary valve is open.

12. The system of claim 9 wherein a first portion of the rotary shaft within the proximal end of the hollow guidewire has a first diameter sized for a slidable rotating fit within an inner diameter of the hollow guidewire, and a second portion of the rotary shaft adjacent to a proximal end of the hollow guidewire has a second diameter substantially equal to an outer diameter of the hollow guidewire.

13. The system of claim 9 further comprising:
an inflation hole formed in a sidewall of the hollow guidewire that allows fluid to be injected into the central lumen of the hollow guidewire when the rotary valve is open.

14. The system of claim 9 further comprising:
a containment groove circumferentially disposed about the rotary shaft, the containment groove mated to a protrusion extending inwardly from an inner diameter of the hollow guidewire to prevent axial movement of the rotary shaft within the hollow guidewire.

15. The system of claim 9 further comprising:
a polymeric plug formed around a portion of the rotary shaft within the hollow guidewire, the polymeric plug providing a fluid seal near the proximal end of the hollow guidewire.

16. The system of claim 15 further comprising:
a channel formed in a portion of the polymeric plug to allow fluid flow into the central lumen of the hollow guidewire when the rotary valve is open.
17. The system of claim 9 further comprising:
a detachable valve actuator operably attached to the hollow guidewire and the rotary shaft, wherein the rotary valve is rotated into one of an open position or a closed position when the valve actuator is actuated.
18. The system of claim 17 further comprising:
an inflation fluid port operably coupled to the detachable valve actuator, wherein fluid from an inflation fluid supply connected to the inflation fluid port flows through the central lumen of the hollow guidewire when the rotary valve is open.
19. A method of operating a balloon catheter, comprising:
rotating a rotary shaft, a portion of the rotary shaft extending within a hollow guidewire;
opening an inflation hole responsive to the rotation of the rotary shaft;
injecting fluid through the open inflation hole and through the hollow guidewire; and
inflating an inflatable balloon in communication with the hollow guidewire.
20. The method of claim 19 further comprising:
coupling a valve actuator to the rotary shaft and the hollow guidewire.

21. The method of claim 20 further comprising:
injecting fluid through an inflation port operably coupled to the valve actuator.
22. The method of claim 21 further comprising:
rotating the rotary shaft to close the inflation hole; and
detaching the valve actuator from the rotary shaft and the hollow guidewire.
23. The method of claim 22 further comprising:
reattaching the valve actuator to the rotary shaft and the hollow guidewire;
rotating the rotary shaft to open the inflation hole;
extracting fluid through the hollow guidewire; and
deflating the inflatable balloon.
24. The method of claim 23 further comprising:
rotating the rotary shaft to a closed position; and
removing the valve actuator from the rotary shaft and the hollow guidewire.